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IS : 5950 - 1984

*Indian Standard*

SPECIFICATION FOR  
SHOT FIRING CABLES ( FOR USE OTHER  
THAN IN SHAFTS )  
( *First Revision* )

UDC 621.315.21 : 622.235



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**INDIAN STANDARDS INSTITUTION**  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

# *Indian Standard*

## SPECIFICATION FOR SHOT FIRING CABLES ( FOR USE OTHER THAN IN SHAFTS ) ( *First Revision* )

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*Indian Standard***SPECIFICATION FOR  
SHOT FIRING CABLES ( FOR USE OTHER  
THAN IN SHAFTS )***( First Revision )***0. FOREWORD**

**0.1** This Indian Standard ( First Revision ) was adopted by the Indian Standards Institution on 3 July 1984, after the draft finalized by the Power Cables Sectional Committee had been approved by the Electro-technical Division Council.

**0.2** This standard was originally published in 1971. The series of standards on cables has been taken up for revision to line up with international practice and to update the standards in the light of further experience and development. This standard has also, therefore, been revised accordingly. The range of cables has been rationalised. Only PVC insulated cables of two types have been retained now — a single core cable for multi-shot firing and a twin cable for single- or multi-shot firing.

**0.3** In preparing this standard, assistance has been derived from the NCB, Specification No. 115-1975 'Shot firing cables ( for use other than in shafts )', issued by the National Coal Board, London.

**0.4** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960\*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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**SECTION 1 GENERAL****1. SCOPE**

**1.1** This standard covers requirements and test for the following two types of shot firing cables for use other than in shafts:

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\*Rules for rounding off numerical values ( revised ).

**Type I** Twin cable ( parallel twin ) for single-shot and multi-shot firing.

**Type II** Single-core cable for multi-shot firing.

## **2. TERMINOLOGY**

**2.0** For the purpose of this standard, the following definitions, in addition to those given in IS : 1885 ( Part 32 )-1971\*, shall apply.

**2.1 Type Tests** — Tests required to be made before supply on a general commercial basis a type of cable in order to demonstrate satisfactory performance characteristics to meet the intended application.

**NOTE**— These tests are of such a nature that after they have been made they need not be repeated unless changes are made in the cable materials or design which might change the performance characteristics.

**2.2 Acceptance Tests** — Tests carried out on samples taken from a lot for the purpose of acceptance of the lot.

**2.3 Routine Tests** — Tests made by the manufacturer on all finished cable lengths to demonstrate the integrity of the cable.

## **SECTION 2 MATERIALS**

### **3. CONDUCTOR**

**3.1** The conductors shall be composed of plain annealed copper wires complying with IS : 8130-1984†, to the extent applicable.

### **4. INSULATION**

**4.1** The insulation shall be of PVC compound conforming to the requirements of Type A compound of IS : 5831-1984‡.

### **5. SHEATH**

**5.1** The sheath shall be of PVC compound conforming to the requirements of Type ST 1 compound of IS : 5831-1984‡.

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\*Electrotechnical vocabulary : Part 32 Cables, conductors and accessories for electricity supply.

†Specification for conductors for insulated electric cables and flexible cords (*first revision*).

‡Specification for PVC insulation and sheath of electric cables (*first revision*).



## SECTION 3 CONSTRUCTION

### 6. CONDUCTOR

**6.1** The conductor shall comply with the requirements for Class 2 conductors specified in IS : 8130-1984\*, except that the minimum number of wires shall be 7. The nominal cross-sectional area of conductor shall be 1 mm<sup>2</sup> for Type I and 2.5 mm<sup>2</sup> for Type II cables.

### 7. INSULATION

**7.1** The conductor shall be provided with PVC insulation in accordance with 7.1.1 or 7.1.2, as applicable.

**7.1.1 Type I** — Two conductors shall be laid parallel and provided with PVC insulation applied by extrusion simultaneously to give a figure of eight cross sections such that the cores can readily be separated without damage to either. The nominal radial thickness of insulation ( $t_i$ ) on each core shall be 0.8 mm.

**7.1.2 Type II** — The conductor shall be provided with PVC insulation applied by extrusion. The nominal radial thickness of insulation ( $t_i$ ) shall be 1.0 mm.

**7.2 Tolerance on Thickness of Insulation** — The average thickness of insulation shall be not less than the respective nominal value ( $t_i$ ) specified in 7.1.1 and 7.1.2. The smallest of the measured values of thickness of insulation shall not fall below the nominal value ( $t_i$ ) by more than 0.1 mm + 0.1  $t_i$ .

**7.3 Colour of Insulation** — The colour of PVC insulation shall be white for Type I and black for Type II.

### 8. SHEATH

**8.1** Single-core Type II cables shall be provided with PVC sheath applied by extrusion over the insulation. The nominal radial thickness of sheath ( $t_s$ ) shall be 1.2 mm.

**8.2 Tolerance on Thickness of Sheath** — The average thickness of sheath shall be not less than the nominal value ( $t_s$ ) specified in 8.1. The smallest of the measured values of thickness of sheath shall not fall below the nominal value ( $t_s$ ) by more than 0.2 mm + 0.2  $t_s$ .

**8.3 Colour of Sheath** — The colour of sheath shall be white.

\*Specification for conductors for insulated electric cables and flexible cords (first revision).

## SECTION 4 TESTS

### 9. CLASSIFICATION OF TESTS

**9.1 Type Tests** — The following shall constitute type tests:

- a) Annealing test,
- b) Conductor resistance test,
- c) Test for thickness of insulation and sheath,
- d) Physical tests for PVC insulation and sheath:
  - i) Tensile strength and elongation at break,
  - ii) Ageing in air oven,
  - iii) Loss of mass test,
  - iv) Hot deformation,
  - v) Heat shock,
  - vi) Shrinkage,
- e) Voltage test,
- f) Insulation resistance test, and
- g) Flammability test.

**9.2 Acceptance Tests** — The following shall constitute acceptance tests:

- a) Annealing test,
- b) Conductor resistance test,
- c) Test for thickness of insulation and sheath,
- d) Voltage test, and
- e) Insulation resistance test.

**9.3 Routine Tests** — The following shall constitute routine tests:

- a) Conductor resistance test, and
- b) Voltage test or spark test.

## 10. TEST DETAILS

**10.1 General** — Unless otherwise specified, the tests shall be carried out in accordance with appropriate part of IS : 10810\* taking into account the additional information given in 10.2 to 10.4.

### 10.2 Voltage Test

**10.2.1** This test shall be carried out at an ac voltage of 1 500 V (rms) applied for 5 minutes. There shall be no breakdown of insulation.

**10.2.2** For the single-core cable (Type II), the voltage shall be applied to the sample of cable after immersing it in water at room temperature for not less than 12 hours and while it is still immersed.

**10.2.3** For the twin cable (Type I), the voltage shall be applied between conductors with the cable dry in air.

### 10.3 Spark Test

**10.3.1** As a routine test, spark test may be carried out as an alternative to voltage test ( 10.2 ) at the core stage during manufacture of cable.

**10.3.2** For the purpose of this test, twin cable Type I shall be regarded as one core and both the conductors shall be earthed.

**10.3.3** The electrode voltage shall be 6 kV ( rms ).

**10.4 Flammability Test** — Period of burning after removal of the flame shall not exceed 60 seconds and the unaffected ( uncharred ) portion from the lower edge of top clamp shall be at least 50 mm.

## SECTION 5 IDENTIFICATION, PACKING AND MARKING

### 11. IDENTIFICATION

**11.1 Manufacturer's Identification** — Manufacturer shall be identified throughout the length of the cable by means of a tape bearing manufacturer's name or trade-mark, or manufacturer's name or trade-mark being printed or embossed on the cable. In case none of these methods can be employed, or if the purchaser so desires, coloured identification threads in accordance with the scheme to be approved by the Indian Standards Institution shall be employed. The printing or embossing shall be done on the insulation in case of unsheathed cables and on the sheath in case of sheathed cables. The distance between any two consecutive printings or embossings shall be not more than 1 m.

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\*Methods of test for cables.

**11.2 Cable Code** — The following code shall be used for designating the cable:

<i>Constituent</i>	<i>Code Letter</i>
PVC insulation	Y
PVC sheath	Y

**NOTE** — No code letter is required for copper conductor.

## **12. PACKING AND MARKING**

**12.1** The cable shall be either wound on reels or supplied in coils packed.

**12.2** The cable shall carry the following information stencilled on the reels or contained in a label attached to the reel or coils:

- a) Reference to this Indian Standard,
- b) Manufacturer's name, brand name or trade-mark,
- c) Type of shot firing cable,
- d) Number of cores,
- e) Nominal size of conductor,
- f) Cable code,
- g) Length of cable on reel or in coil,
- h) Country of manufacture, and
- j) Year of manufacture.

**12.2.1** Cable ( reel or label ) may also be marked with the ISI Certification Mark.

**NOTE** — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution ( Certification Marks ) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.



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